Intro to BEAMS3D in Stellopt

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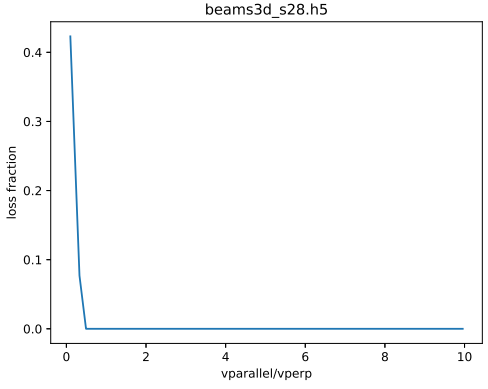
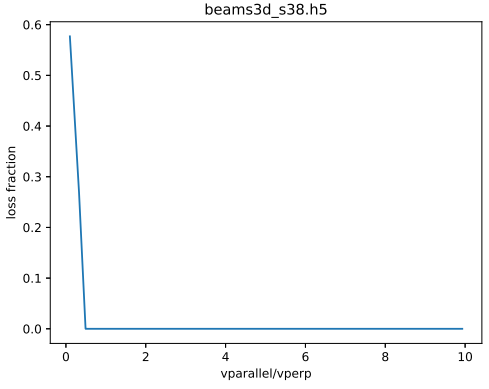
Beams3D for Monte-Carlo optimization of fast-ion transport

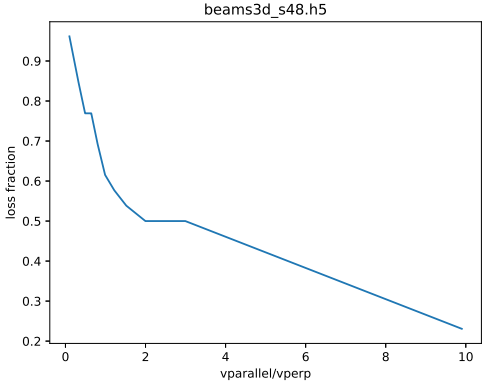
- Currently no good metric for fast-ion transport
- In lieu of a metric, we instead generate fast-ions and follow them for $\sim$ one collision time
- The optimization metric is the percentage of particles that leave the domain
- Inputs to BEAMS3D
  - Number of poloidal (N_u) and toroidal (N_v) points to sample
  - Particle energies, given as arrays of $v_{||}$ and $v_{\perp}$, or as $v_{||}$ and μ
  - Number of flux surfaces to optimize for, and weights for each flux surface
  - The code will follow one particle for each coordinate point, so $N_u N_v N_{vel} N_s$ points
  - For this talk: very initial results for $N_v = N_u = 5$ and $N_{vel} = 11$

Results for Michael Drevlak's QHS configuration, "optimized" for Alpha-particle transport

Michael Drevlak has generously provided us with a VMEC file for a QHS configuration optimized for energetic ion transport.







Losses from Beams 3D are higher than what M. Drevlak calculated